Remarks

Reexamination and reconsideration of this application is requested. Claims 1-5 have been cancelled by this amendment. Claims 8, 9 and 16 have been amended only to add the trademark symbol. Claims 12 and 13 have been amended based on an objection by the Examiner of claim 13. Claim 18 has been amended to overcome the prior art of record. Claims 15-20 have been renumbered to agree with the Examiner's comment that he renumbered the claims. No new claims have been added. Claims 6-21 remain in the application.

Objection to claim 13

The Office Action objects to a portion of claim 13. By this amendment claims 12 and 13 have been amended to overcome this objection. The amendments to claims 12 and 13 are not made to overcome prior art, but rather to remove any ambiguousness that may have been present in these claims.

Response to the 35 U.S.C. §102(b) and 102(e) Rejection

The Office Action rejects claim 1 under 35 U.S.C. §102(b) as clearly anticipated by Smith (US 5,444,864) and claims 1-3 have been rejected under 35 U.S.C. §102 (e) and anticipated by Druilhe (US 6,452,967 B1). By this amendment claims 1-5 have been cancelled and therefore the rejection of these claims is mute.

Response to the 35 U.S.C. §103(a) Rejection

The Office Action rejects claims 2-21 under 35 U.S.C. §103 (a) as being unpatentable over Smith (US 5,444,864) in view of Kenworthy (US 5,691,978). Applicant respectfully traverses this rejection in view of the reasons stated below.

Rejection of Claims 2-5

By this amendment claims 1-5 have been cancelled and therefore the rejection of claims 2-5 is mute.

Rejection of Claims 6-11

Applicant believes the rejection of claims 6-11 has been overcome in view of the remarks that follow.

Applicant's claim 6 recites, among other things, an Analog-to-Digital Converter (ADC) to convert data received in a receiver path and a Digital-to-Analog Converter (DAC) to convert data to be transmitted in a transmitter path.

Applicant agrees with the Examiner that Smith does not disclose converters. The relied upon reference of Kenworthy does disclose an RF communication system having a digital adaptive filtering to cancel interference. However, Applicant respectfully disagrees with the Examiner that Kenworthy shows the converters of Applicant's claim 6. Kenworthy only shows A/D converters (FIG. 3), not a DAC as claimed in Applicant's claim 6. Accordingly, the relied upon references, either taken singularly or in combination, have failed to show at least this feature of Applicant's claim 6, and therefore, the combination cannot make Applicant's claim 6 obvious.

Applicant's claims 7-11 depend from base claim 6 and are believed to be allowable over the relied upon reference for at least the same reasons as claim 6.

<u>Rejection of Claims 12-17</u>

Applicant believes the rejection of claims 12-17 has been overcome in view of the remarks that follow.

Applicant's claim 12 recites, among other things, a cancellation circuit having inputs to receive the transmitter digital data and the receiver digital data and generate an out-of-phase signal that is combined with the receiver analog signal to cancel at least a portion of interference from the transmitter path in the receive path.

Smith illustrates in Figure 1 and discloses receiving an analog signal on the transmitter side and an analog signal on the receiver side that are supplied to a signal canceler 12. Both of the analog signals are tapped at the diplexor 22 prior to any signal processing. Clearly Smith does not teach or suggest having a cancellation circuit that receives transmitter <u>digital</u> data and receiver <u>digital</u> data.

Kenworthy discloses an RF communication system having a digital adaptive filter having inputs to receive the transmitter digital data and the receiver digital data. However, Kenworthy teaches in column 3, line 67, and continuing in column 4, line 4, that the adaptive filter attempts to minimize the output signal E from the cancellation circuit. Kenworthy's adaptive filter filters out the transmit interference signal, leaving just the received signal. This is further shown in FIGs. 1 and 4-6 where the signal E from the adaptive filter is an input to the demodulator 29. Put another way, Kenworthy teaches that the output of his adaptive filter is <u>already clean</u> of transmit interference, whereas

Applicant claims generating an out-of-phase signal that is combined with the receiver analog signal to cancel at least a portion of interference from the transmitter path in the receive path. Consequently, the relied upon references have failed to show at least this feature of Applicant's claim 12, and therefore, the combination cannot make Applicant's claim 12 obvious.

Applicant's claims 13-17 depend from base claim 12 and are believed to be allowable over the relied upon reference for at least the same reasons as amended claim 12. Note that Applicant's claim 14 recites, among other things, a Digital-to-Analog Converter (DAC) which neither of the relied upon references teach, further precluding anticipation of Applicant's claim.

Rejection of Claims 18-21

Applicant believes the rejection of claims 18-21 has been overcome in view of amendment to claim 18 and the remarks that follow.

Applicant's amended claim 18 recites, among other things, processing the first and second digital values to generate an out-of-phase signal that is combined with the signal received by the receiver to mitigate the interference in the signal converted by the receiver.

As previously mentioned, Kenworthy teaches that his adaptive filter attempts to minimize and filter out the transmit interference signal, leaving just the received signal. Thus, Kenworthy's adaptive filter provides an output signal that is clean of transmit interference, whereas Applicant's claim 18 recites processing the first and second digital values to generate an out-of-phase signal that is combined with the signal received by the receiver. Thus, the relied upon references, either taken singularly or in combination, have failed to show at least this feature of Applicant's claim 18, and therefore, cannot make Applicant's claim 18 obvious.

Applicant's claims 19-21 depend from base claim 18 and are believed to be allowable over the relied upon reference for at least the same reasons as claim 18.

Conclusion

The foregoing is submitted as a full and complete response to the Office Action mailed November 01, 2002, and it is submitted that claims 6 -21 are in condition for allowance. Reconsideration of the rejection is requested. Allowance of these claims is earnestly solicited.

Should it be determined that an additional fee is due under 37 CFR §§1.16 or 1.17, or any excess fee has been received, please charge that fee or credit the amount of overcharge to deposit account #02-2666.

If the Examiner believes that there are any informalities that can be corrected by an Examiner's amendment, a telephone call to the undersigned at (480) 552-1388 is respectfully solicited.

Respectfully submitted,
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Marked version of the paragraphs found in the specification starting on page 3, line 15 and continuing to page 5, line 11.

The modulated Radio Frequency (RF) signals received at an antenna 20 contain information that may be recovered in a receiver 30 of the electronic system. A Low Noise Amplifier (LNA) 30 may receive and amplify the incoming modulated RF signals. A subtractor circuit 40 may be connected to the output of LNA 30. The output signal from subtractor circuit 40 may be passed to RF mixer 50 along with a generated Local Oscillator (LO) signal. RF mixer 50 may down convert the high frequency modulated signal to a lower Intermediate Frequency (IF) signal. Thus, the modulated signal and the LO signal may be "mixed" to translate the carrier frequency of the modulated signal from the RF range to the IF range. The down converted signals may then be amplified by a gain amplifier 60. The amplified signal may be converted by an Analog-to-Digital Converter (ADC) 80 from analog signals to a digital value that is proportional to the input value of the analog signals. [The digital values following the Bluetooth Special Interest Group (Bluetooth SIG) specification may be processed in the remaining portion of a Bluetooth receiver 90 and the digital signals following the Institute of Electrical and Electronics Engineers (IEEE) 802.11b specification may be processed in the remaining portion of an 802.11b receiver 100.] <u>The digital values following the Bluetooth Special Interest Group (Bluetooth is a registered trademark of the Bluetooth Special Interest Group) specification may be processed in the remaining portion of a Bluetooth™ receiver 90 and the digital signals following the Institute of Electrical and Electronics Engineers (IEEE) 802.11b specification may be processed in the remaining portion of an 802.11b receiver 100.</u> Receiver 90 may include channel filters, a demodulator and circuits for other baseband processing for [Bluetooth] <u>Bluetooth™</u> and receiver 100 may include channel filters, a demodulator and circuits for other baseband processing for IEEE 802.11b.

A transmitter 230 of transceiver 10 may transmit data formatted in accordance with the [Bluetooth] <u>Bluetooth™</u> specification as received from TX [Bluetooth] <u>Bluetooth™</u> block 190 or data formatted for the IEEE 802.11b specification as received from TX 802.11b block 200. TX [Bluetooth] <u>Bluetooth™</u> block 190 may provide the baseband processing for [Bluetooth] <u>Bluetooth™</u> such as, for example, symbol mapping and modulation, among other processing functions. TX 802.11b block 200 may provide the 802.11 baseband processing. Transmitter 230 may use a Digital-to-Analog Converter (DAC) 180 to generate analog output signals that are proportional to the input value of the digital values stored in the register. The analog signal may be provided to a gain

amplifier 160. The output signal from gain amplifier 160 may be passed to mixer 150 along with a generated Local Oscillator (LO) signal. Mixer 150 may up convert the modulated signal to an RF signal. The up converted signals may then be amplified by a gain amplifier 140 and passed to antenna 120 for transmission.

Transceiver 10 includes an adaptive interface cancellation circuit 110. Cancellation circuit 110 may receive data from receiver 30 and transmitter 230 and generate an output signal that may be fed back to subtractor circuit 40. More specifically, cancellation circuit 110 may receive the data presented to DAC 180 and the data generated by ADC 80. The data at the input to DAC 180 may be a high quality copy of the signal that is being prepared for transmission. The data at the output of ADC 80 may be another copy of that transmitted signal as received through receiver 30.

In operation, an electronic device such as transceiver 10 may operate different protocols and may receive signals whose frequencies periodically overlap. In such cases, transmitter 230 may transmit on the same frequency that receiver 30 or another transceiver is transmitting and a collision may occur. In other words, the electronic device may process signals that overlap when both devices are transferring information. Although the scope of the present invention is not limited in this respect, one transceiver may be selected to process signals using the Institute of Electrical and Electronics Engineers (IEEE) 802.11b specification while another transceiver may process signals using the [Bluetooth] Bluetooth™ specification. Thus, the integrated RF front end of the transceiver may simultaneously carry both [Bluetooth] Bluetooth™ and IEEE 802.11b signals. It should be pointed out that two devices, one operating with IEEE 802.11b and another with [Bluetooth] Bluetooth™ radio, may operate in common frequency space about 28 percent of the time (79 hopping channels at 1MHz each divided by 22MHz = 28%). Thus, without adaptive interface, the opposing transmitters may have interference about 28 percent of the time.